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## BESICOVITCH ALMOST AUTOMORPHIC SOLUTIONS OF NONAUTONOMOUS DIFFERENTIAL EQUATIONS OF FIRST ORDER

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ABSTRACT. The main purpose of this paper is to analyze the existence and uniqueness of Besicovitch almost automorphic solutions and weighted Besicovitch pseudo-almost automorphic solutions of nonautonomous differential equations of first order. We provide an interesting application of our abstract theoretical results.

### REFERENCES

1. P. Acquistapace and B. Terreni, *A unified approach to abstract linear nonautonomous parabolic equations*, Rend. Sem. Mat. Univ. Padova **78** (1987), 47–107.
2. F. Bedouhene, N. Challali, O. Mellah, P. Raynaud de Fitte, and M. Smaali, *Almost automorphy and various extensions for stochastic processes*, J. Math. Anal. Appl. **429** (2015), no. 2, 1113–1152.
3. A. S. Besicovitch, *Almost periodic functions*, Dover Publications Inc., New York, 1954.
4. M. Baroun, S. Boulite, G. M. N'Guérékata, and L. Maniar, *Almost automorphy of semilinear parabolic evolution equations*, Electron. J. Differential Equations, **2008**, no. 60, 9pp.
5. J. Blot, P. Cieutat, and K. Ezzinbi, *New approach for weighted pseudo-almost periodic functions under the light of measure theory, basic results and applications*, Appl. Anal. **92** (2011), no. 3, 493–526.

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6. J. Blot, G. M. Mophou, G. M. N'Guérékata, and D. Pennequin, *Weighted pseudo almost automorphic functions and applications to abstract differential equations*, *Nonlinear Anal.* **71** (2009), no. 3-4, 903–909.
7. T. Diagana, *Almost automorphic type and almost periodic type functions in abstract spaces*, Springer–Verlag, New York, 2013.
8. T. Diagana, K. Ezzinbi, and M. Miraoui, *Pseudo-almost periodic and pseudo-almost automorphic solutions to some evolution equations involving theoretical measure theory*, *Cubo*, **16** (2014), no. 2, 01–31.
9. T. Diagana, *Stepanov-like pseudo-almost periodicity and its applications to some nonautonomous differential equations*, *Nonlinear Anal.* **69** (2008), no. 12, 4277–4285.
10. T. Diagana, *Existence of pseudo-almost automorphic mild solutions to some nonautonomous partial evolution equations*, *Adv. Difference Equ.* **2011**, Art. ID 895079, 23 pp.
11. H.-S. Ding, W. Long, and G. M. N'Guérékata, *Almost periodic solutions to abstract semilinear evolution equations with Stepanov almost periodic coefficients*, *J. Comput. Anal. Appl.* **13** (2011), no. 2, 231–242.
12. H.-S. Ding, W. Long, and G. M. N'Guérékata, *Almost automorphic solutions of nonautonomous evolution equations*, *Nonlinear Anal.* **70** (2009), no. 12, 4158–4164.
13. H.-S. Ding, J. Liang, and T.-J. Xiao, *Almost automorphic solutions to nonautonomous semilinear evolution equations in Banach spaces*, *Nonlinear Anal.* **73** (2010), no. 5, 1426–1438.
14. S. Fatajou, N. V. Minh, G. M. N'Guérékata, and A. Pankov, *Stepanov-like almost automorphic solutions for nonautonomous evolution equations*, *Electron. J. Differential Equations* **2007**, no. 121 (2007), 11 pp.
15. G. M. N'Guérékata, *Almost automorphic and almost periodic functions in abstract spaces*, Kluwer Academic/Plenum Publishers, New York, 2001.
16. G. M. N'Guérékata, *Topics in almost automorphy*, Springer–Verlag, New York, 2005.
17. M. Kostić, *Generalized almost periodic solutions and generalized asymptotically almost periodic solutions of inhomogeneous evolution equations*, *Sarajevo J. Math.* (to appear).
18. M. Kostić, *On Besicovitch-Doss almost periodic solutions of abstract Volterra integro-differential equations*, *Novi Sad J. Math.* **47** (2017), no. 2, 187–200.
19. M. Kostić, *Generalized almost automorphic and generalized asymptotically almost automorphic solutions of abstract Volterra integro-differential inclusions*, preprint.
20. M. Kostić, *Generalized weighted pseudo-almost periodic solutions and generalized weighted pseudo-almost automorphic solutions of abstract Volterra integro-differential inclusions*, preprint.
21. M. Kostić, *Almost periodicity of abstract Volterra integro-differential equations*, *Adv. Oper. Theory* **2** (2017), no. 3-5, 353–382.
22. M. Kostić, *Almost periodic and almost Aautomorphic type solutions of abstract Volterra integro-differential equations*, Book Manuscript, 2017.
23. L. Maniar and R. Schnaubelt, *Almost periodicity of inhomogeneous parabolic evolution equations*, *Lecture Notes in Pure and Appl. Math.* **234**, Dekker, New York, 2003, 299–318.
24. R. Zhang, Y.-K. Chang, and G. M. N'Guérékata, *New composition theorems of Stepanov-like weighted pseudo almost automorphic functions and applications to nonautonomous evolution equations*, *Nonlinear Anal. Real World Appl.* **13** (2012), no. 6, 2866–2879.

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